Eurilia (European Initiative in Library and Information in Aerospace)

Current developments in the provision of aerospace information: the role of electronic sources including Internet

John Harrington
Cranfield Information and Library Service

COA report No.9403
November 1994
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ISBN 1 871564 73 5

£10

"The views expressed herein are those of the author/s alone and do not necessarily represent those of the University"
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INTRODUCTION

This report is part of the Eurilia (European Initiative in Library and Information in Aerospace) project, the aim of which is to enhance the Libraries' R&D and education process which underpins the aerospace sector by establishing a new service based on a standardised pan-European system for information access, retrieval, image browsing and document delivery. This will in turn extend the access and availability of major aerospace collections.

The partners in this project are:

University of Limerick
Delft University of Technology
Digital Equipment Corporation
Sup’Aero, ENSAE - Ecole National Supérieure de l’Aéronautique et de l’Espace
Instituto Nacional de Tecnica Aeroespacial
Cranfield University

This report was originally presented at the international seminar on Eurilia held at Cranfield University in July 1994. The report was subsequently submitted to the EC as Eurilia (European Initiative in Library and Information in Aerospace), Pre-project Audit, Project LIB-EURILIA/3-2083 funded by the European Action Programme for Libraries, EURILIA/WP1/DR1/CU/JB/941014/V1.0, October 1994.
1 **Background to Eurilia**

This paper will review a number of recent developments in the provision of aerospace information. Over the last twenty years, electronic access to bibliographic information in aerospace has been led largely by dial-up online services. This paper looks briefly at current online developments, but also discusses changing modes of access, including CD-ROM and the Internet. In particular it will focus on Eurilia (European Initiative in Library and Information in Aerospace), a collaborative approach to enhancing the supply of information to the aerospace research community.

This paper will briefly describe the background to the project, and will attempt to review Eurilia's goals and objectives in the context of other developments in aerospace information provision.

Eurilia is a three year project, part-funded by the Commission for the European Community's Action Programme for Libraries, that aims to enhance the teaching and research activity that underpins the aerospace sector.

From its start date in February 1994, Eurilia will attempt to establish a pan-European system for information access, retrieval, image browsing and document delivery. It will extend access to, and the availability of, documents contained in a number of existing major aerospace collections.

In detail, the project objectives are:

- to develop a standard interface based on ISO SR (Z39.50), to provide common access to the online public access catalogues (OPAC) of aerospace library collections;

- to develop a PC based user application that will eventually integrate the SR OPAC access, network interconnection, image browsing and document delivery into a coherent new service and a model that could be transferable to other sectors;

- to establish effective networking links between all Eurilia partners, using an available standard open telecommunications network, to provide direct access to the OPACs at Cranfield and Delft, and a prototype image server/document delivery system at Delft;

- to investigate the impact of new Eurilia services on aerospace information users;

- to investigate the management and administration of the OPAC access, image browsing and document delivery aspects of the Eurilia service, and the potential for its subsequent commercial operation.

There are a number of factors which brought the Eurilia partners together in order to collaborate on an aerospace information project at this time.
• **CEC Libraries Programme.** The availability of funding by the European Community, intended to act as a catalysis for co-operative library development in Europe

• **Extension of existing interests.** The aims and objectives of the project reflect, and provide a logical extension to, existing interests amongst the Eurilia partners.

Delft, Sup’Aero, INTA and Cranfield all have major aerospace collections, supporting teaching and/or research. In addition Delft, Sup’Aero and Cranfield are already involved in a CEC funded aerospace project. This is the European Consortium in Advanced Training and Aerospace (ECATA), which is an advanced, post-experience training programme for key personnel in the European aerospace industry.

The University of Limerick has a developing requirement to provide its users with access to aerospace information. Without a large aerospace collection of its own, the University sees Eurilia as a means to facilitate access to relevant collections elsewhere, and as a potential outlet through which it can achieve wider dissemination of its own aerospace research and expertise.

Digital will use Eurilia as a technology demonstrator which will utilise a range of software capable of being developed into a full commercial product.

• **Collaboration in Aerospace.** The well established international and collaborative nature of the aerospace sector makes it the ideal focus for a subject based approach to resource sharing across national boundaries.

• **Changes in aerospace information provision.** For a long period NASA has held a pre-eminent position through its partnership with the American Institute of Aeronautics and Astronautics (AIAA), which supported the production of the Aerospace Database, the largest and longest established online source for bibliographic information in aerospace. There does now however seem to be a whole new series of opportunities and challenges occupying the aerospace information sector at present. It is possible to identify a number of trends which are discussed in more detail below.

2 **Changes in aerospace information provision**

2.1 **Online**

As far as dial-up online services are concerned, NASA’s position as an aerospace producer was maintained through the creation of its bilateral and then, with the European Space Agency’s Information Retrieval Service (ESA/IRS), its trilateral agreements with individual user organisations which defined and regulated access to the Aerospace database (known as the NASA database to ESA/IRS users in Europe).

This situation seems now certain to change, under the influence of a number of factors, including the following:
- The development of alternative aerospace databases. This process began some years ago with ESA's creation of the European Aerospace Database (EAD) and in the past year, the German Aerospace Database, the Deutsche Luft-Und Raumfahrt Datenbank (DELURA), has also become available. Further aerospace databases are in various stages of planning and development in Japan and France, and there is much interest in widening access to information derived from Russian and other former Eastern Bloc sources.

- The concept of National Aerospace Information Centres. The creation of these new aerospace databases has focussed attention on how they can be expanded to establish effective bibliographic control over each nation's output of aerospace documents.

NASA and ESA currently seem to be favouring the concept of National Aerospace Information Centres, which would have responsibility for collecting aerospace documents within each country and would process a bibliographic record for each document in a NASA or ESA compatible format. The number of documents processed and/or full text copies of grey literature (reports, theses, patents, etc.) would regulate access to those databases. Both ESA and NASA seem to have accepted this principle of reciprocity as a way of regulating access to their databases, but it is unclear how these National Centres should operate and most importantly how they will be funded.

- International Aerospace Database Proposal. Over the last two years there has been much discussion about the creation of an International Aerospace Database. The aims of the database would be to maintain compatibility in retrieval, eliminate unnecessary duplication, and to share the burden and cost of acquisition, organisation, and dissemination through international co-operation and resource sharing.

In view of the recent, highly publicised dispute between NASA and the AIAA, and the very complex political negotiations still to be agreed, especially between the interested parties in the US and in Europe, it does seem somewhat doubtful that the IAD concept will be realised in the very near future.

3 Other modes of access

3.1 CD-ROM

Perhaps the most significant development in CD-ROM access to aerospace information in the last few months is the availability, for the first time, of the aerospace database to customers outside the United States. With coverage back to 1986, and containing over 500,000 records, this is the premier CD-ROM based aerospace information source available at this time. However, it should be noted that the dispute between NASA and the AIAA has meant that many of NASA's documents for 1994 have yet to be included on the database. At the time of writing the AIAA were hopeful that the situation could soon be resolved and that a series of additional updates would be used to get the missing data distributed to existing subscribers.
3.2 The Internet

The last couple of years have also seen a number of very interesting service developments on the Internet and this should now be considered a potentially very valuable means of accessing and retrieving information related to many aspects of aerospace.

The very dynamic, and yet almost chaotic, nature of the Internet, makes it difficult to present anything like a fully complete and up to date overview of these developments. However it is possible to give some examples here which will hopefully give a flavour of the sort of information sources that are now available.

As a starting point for looking for useful aerospace information sources, a look at some of the following general guides is recommended.

- **UK Bulletin Board for Libertas (BUBL)**. The BUBL subject tree provides links to resources in Gopher space (figs 1 & 2).

- **World Wide Web (WWW) Virtual Library**. Distributed catalogue of sources arranged by subject through the World Wide Web search software. Each subject list is maintained by a separate site or organisation and includes aeronautical, aerospace and general aviation pages, maintained by Embry-Riddle Aeronautical University in the US (figs 3 & 4).

- **The Whole Internet Catalog**. This is a well established guide published by O'Reilly & Associates. It is accessible and updated over the Internet via the Global Network Navigator Service (figs 5 & 6).

- **Aerospace Engineering**. Guide to Internet Resources produced by Clearinghouse for Subject Oriented Internet Resources Guides, School of Information and Library Studies, University of Michigan (fig 7).

4 Other useful sources

NASA has been very active in the development of information services over the Internet. The starting point for an exploration of these is the NASA home page (fig 8).

In order to illustrate some of the services available from NASA have a look for example at:

- Hot Topics for current news items (fig 9);

- the NASA Scientific and Technical Information Program (NASA STI) which includes Selected Current Aerospace Notices (SCAN), current awareness (figs 10 and 11);

- the NASA Thesaurus (fig 12);
• access to the NASA RECON database 1990-92 (figs 13 & 14).

It is also possible to obtain full text copies of selected NASA reports via the NASA Technical Reports Server (NTRS) (figs 15 & 16). NASA also provides excellent Internet links to, and between, its various research centres, and to other external agencies and research organisations (figs 17 & 18).

ESA is also in the process of developing some very interesting sources on the Internet, including descriptions of its various programmes (fig 19), its own European Space Information System (fig 20) and full text electronic papers (fig 21).

The wealth of aerospace information available across the Internet is impressive in both its variety and amount. A miscellaneous set of examples includes aircraft performance data from the Aeronautics Archive (fig 22), an index of online Federal Aviation Regulations in full text (fig 23), as well as a whole host of university aerospace schools and departments such as the examples given here from Stanford University in the US (figs 24 & 25), Delft University of Technology (fig 26) and Cranfield University (figs 27 & 28).

5 Eurilia goals and objectives in context

In order to illustrate how the Eurilia project will fit into the context of the other developments in aerospace information provision, it is helpful to refer to three fundamental goals that the project shares with the International Aerospace Database concept described above. These goals are:

• to maintain compatibility with existing aerospace information services

• to avoid wasteful duplication

• to share resources

5.1 Maintain Compatibility

Compatibility in terms of information retrieval will be assisted by:

• using the NASA/ESA scope to define Eurilia subject coverage;

• indexing records using terms from NASA thesaurus;

• a number of options which are being explored for providing links to the thesaurus online, e.g. via Internet connection, as a separate menu option with a copy mounted on the Delft server, or fully integrated as part of a subset of the Cranfield/Delft OPACs.

5.2 Avoid Duplication

Eurilia is seen as a way of optimising utilisation and access to the collections of the Eurilia partners.
The full text image browsing capability will focus initially on Cranfield's thesis collection. Although this will largely consist of relevant aerospace PhD theses, access will also be provided to fifty prize winning MSc theses as part of the initial sample. It is hoped that Eurilia will be expanded to include other sorts of documents, with all of the partners eventually contributing to the expansion of the database.

5.3 Resource Sharing

Eurilia will also exploit the use of the Internet as the networking infrastructure, to provide access to the OPACs of Cranfield and Delft, and a prototype image server/document delivery system at Delft. The adoption of the Internet will provide a readily accessible and cost effective means of developing resource sharing policies for information access, and document delivery amongst the Eurilia partners.

Eurilia is therefore all about exploring collaboration at an international level between a number of organisations who share research and teaching interests in a common subject area. With its emphasis on providing a common interface and an integrated access, retrieval, document browsing and delivery facility, the project fully reflects current concerns in the aerospace information sector with issues of information collaboration, compatibility and the effective use of shared resources.

REFERENCES


Fig. 1

Document Title: BUBL Subject Tree: Links to Resources in Gopher

Document URL: gopher://ukoln.bath.ac.uk:7970/11/Link/Tree

- 608.3 - Patents (Specifications of Inventions)
- 61 - Medical Sciences
- 616.89 - Psychiatry (under construction)
- 619 - Veterinary Medicine, Comparative Pathology
- 62 - Engineering
- 629.13 - Aeronautical Engineering, Aircraft, Aviation
- 629.19 - Space (Astronautics)
- 63 - Agriculture, Forestry, Fisheries
- 64 - Hotel Management, Catering, Food and Drink
- 65 - Management
- 655.4/5 - Publishing and Bookselling
- 66 - Chemical Engineering
- 67 - Industries and Crafts
- 69 - Building Industry
- 70 - Arts
- 72 - Architecture
- 77 - Photography
- 78 - Music
- 79 - Recreation, Entertainment
629.12 - Space, Astronautics

Space Resources
- BUBL Gopher Resources on Space, Astronautics

Space & Astronomy

ADS Abstracts
- Astrophysics Data System (ADS): Abstract Service

Exploratorium
- Exploratorium WWW Server

Space Shuttle
- NASA Space Shuttle Small Payloads Programs

EIT
- EIT

Jet
- Jet Propulsion Lab Space Calendar home page

NASA Langley
- NASA Langley Technical Library

NASA WWW
- NASA's STELAR Project Astronomical Services

NASA Technical Reports
- NASA Technical Reports Server

NOAA
- NOAA's Space Environment Laboratory now offers a WWW server providing today's solar weather including a current solar image, x-ray and proton plots from GOES satellites, and the latest forecast of solar-terrestrial conditions.
The WWW Virtual Library

This is a distributed subject catalogue. See Index. See also arrangement by service type., and other subject catalogues of network information.

Mail to maintainers of the specified subject or www-request@info.cern.ch to add pointers to this list, or if you would like to contribute to administration of a subject area.

See also how to put your data on the web

Aeronautics and Aeronautical Engineering
Separate list

Agriculture
See Agricultural info, Almanac mail servers; the Agricultural Genome (National Agricultural Library, part of the U.S. Department of Agriculture); North Carolina Cooperative Extension Service Gopher; Cornell University-CALS - NYSAES WWW server; Not Just Cows: A guide to Internet/Bitnet Resources in Agriculture

Anthropology
Separate list

Archaeology
Separate list

Architecture
Separate list
Aeronautics and Aeronautical Engineering

The World Wide Web Virtual Library: Engineering
The World Wide Web Virtual Library: Aerospace Engineering

14 July 1994:

Comments --- Manufacturers --- Museums --- Related ---
Research --- Search --- Universities

Aeronautical Colleges and Universities

- Embry-Riddle Aeronautical University (ERAU)
  - Aviation and Aerospace Outlook, including research resources

Aerospace Departments at Colleges and Universities

- Florida Institute of Technology (FIT)
- Stanford University, Department of Aeronautics and Astronautics

http://macwww.db.erau.edu/
4 Jul 94 (ISSN 1072–043X) – Updated Weekly

- What's New
- Whole Internet Catalog Top 50
- All Catalog Entries
- All Topics

Arts & Humanities

Anthropology – Archaeology – Art – Classical Languages & Literature –
History & Civilization – History of Science – Humanities – Literature –

Business

Agriculture – Business – Economics – Forestry

Current Affairs
Technology

Technology Transfer

- NASA Mid-Continent Technology Transfer Center
- National Technology Transfer Center

Aeronautics & Astronautics

- NASA News
- NASA Spacelink
- Shuttle and Satellite Images
- Space FAQs
- SpaceMet

Newsgroups: sci.space, sci.astro, sci.aeronautics

Aviation

- Aeronautics Archives
- DUAT

Newsgroups: rec.aviation

Computing
Aerospace Engineering: 
A Guide to Internet Resources

2nd Edition
Revised 3/15/94

Compiled by David Dalquist and Christopher Poterala
School of Information and Library Studies
The University of Michigan
Fall, 1993

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of using the information contained herein.
Welcome to NASA's World Wide Web (WWW) information services.

The NASA Vision

* Hot Topics * ........... NASA news and subjects of public interest

NASA Strategies, Policies, Public Affairs

NASA Information Sources by Subject

NASA Centers (click on a center's name for its home page):

Data transfer complete.

Back | Forward | Home | Reload | Open... | Save As... | Clone | New Window | Close Window
Hot Topics is a hypertext collection of NASA news, subjects, and information sources of particular interest to the public. Some items will be "permanent", while others will be removed when they are no longer topical.

Space Shuttle mission STS-65, launched successfully on July 8, 1994 at 12:43 p.m. EDT. Its main payload is the International Microgravity Laboratory-2 (IML-2). STS-65 crew members will also use the middeck Shuttle Amateur Radio Experiment (SAREX) to communicate with ham radio operators and schools around the World.
NASA Scientific and Technical Information Program

This is an experimental server run by the NASA STI Program.

STI Products

- Selected Current Aerospace Notices (SCAN)
- NASA Thesaurus
- WAIS Access to NASA RECON 1990-1992 data (open to all)
- Telnet to NASA RECON (requires an existing username and password)
- Telnet to ARIN (requires an existing username and password)

Other NASA Resources

Motivated by flight vehicle design problems, this work focuses on optimization problems in which the design variables are parameters of shape. It deals with several Sequential Quadratic Programming methods used to advantage for the solution of shape optimization problems involving systems governed by nonlinear partial differential equations. The contribution is the development of a family of Coordinate Basis In Path (CBIP) optimization methods and its implementation in highly parallel architectures. The methods avoid the solution of the discretized state equations at each design iteration by embedding them as equality constraints in the optimization problem. CBIP methods make use of decomposition into nonorthogonal subspaces that exploits Jacobian sparsity in an optimal fashion. In the absence of a line search, these algorithms require the solution of just two or three linear system optimization iterations. They are therefore more efficient than traditional path-following methods which typically require many stiffness matrix solves to converge the nonlinear state equations at each optimization iteration. In the massively parallel implementation, the construction and solution of algebraic systems is performed in parallel, as are sensitivity computations associated with the state variables. Parallelism is thus extended to the computation of the gradient of the objective function with respect to.
SATellite NAVIGATION SYSTEMS

Narrower Terms:

TRANSIT NAVIGATION SYSTEM

Related Terms:

AUTONOMOUS NAVIGATION
GLOBAL POSITIONING SYSTEM
NAVIGATION SATELLITES
RADAR NAVIGATION
RADIO NAVIGATION
SPACE NAVIGATION
SYSTEMS
NASA RECON WAIS Search

The Scientific and Technical Aerospace Reports (STAR) for the years 1990 through 1992 and International Aerospace Abstracts (IAA) for the years 1990 through 1992 have been WAIS indexed and are available to all sites. This requires that your WWW browser have native WAIS support (like Mosaic 2.0). This means that Mosaic for the Mac and Mosaic for Windows will not work. You will have to obtain a WAIS program for your machine (see FAQ below).

- Search NASA RECON
- Search NASA RECON using NCSA gateway (PC's and Mac's should use this)

Using WAIS

If you are unable to access this data with your World Wide Web client, then obtain one of the WAIS clients for your particular machine. For information on how to obtain WAIS client software, consult the Frequently Asked Questions (FAQ).

What's in this DB?

By using this database the user of this data agrees not to sell or lease any information, data and/or printouts obtained from this database unless specifically authorized by
Variable camber wings for transport aircraft

RAO, A. J.
Cranfield Inst. of Tech., Bedford (England).

Ph.D. Thesis
Published: 1989
Pages: 00257

A variable camber system was designed which ensured that the air profile remained smooth and continuous throughout the range of c shapes without requiring the use of flexible surfaces. It was ma a fixed centre section with modified leading and trailing edge d designed such that their deployment caused a simultaneous rotati translational movement. A series of 2D tests were carried out to investigate the characteristics of this variable camber airfoil.

The effect of distribution of variable section camber across the a transport aircraft wing was investigated using a 30 deg swept, untapered half-wing model. An initial investigation of incorpora proposed variable camber design into a medium haul transport air suggested that, even allowing for an increase in the mechanism w the variable camber devices themselves, a wing weight saving of percent could be achieved compared with the conventional aircraf

COSATI Code: none

Major Subject Terms: AIRCRAFT DESIGN, AIRFOIL PROFILES, CAMBER, WINGS, TRANSPORT AIRCRAFT, VORTICES
Technical Reports, Preprints and Abstracts

Aeronautics

- NTRS - NASA Technical Report Server
  - DTRS - Dryden Technical Report Server (NASA/DFRC)
  - LTRS - Langley Technical Report Server (NASA/LARC)
  - RECON - (see disclaimer) (NASA/STI)
  - Selected Current Aerospace Notes (SCAN) (NASA/STI)

Astronomy and Astrophysics

- Astrophysics Data System
- ESISBIB (European Space Information System)
- Stellar Project (NASA/GSFC)

Computer Science

- Computer Science - General
  - Computer Science Bibliography Glimpse Server
  - ITRS - ICASE Technical Report Server
  - Numerical Aerodynamic Simulation (NAS) Reports (NASA Ames Research Center)
  - Unified CS Tech Reports (IU)
  - Wide Area TEchnical Report System (WATERS) (Va Tech, UVa.)
Fig. 16

NASA Technical Report Server (NTRS)

Enter Search Keywords:

Begin Search | Reset Search

Select the databases you would like to search:

- Ames Research Center - Numerical Aerodynamic Simulation Division (NAS)
- Dryden Flight Research Center
- ICASE - Institute for Computer Applications in Science and Engineering
- Langley Research Center

Data transfer complete.
NASA Internet Connection

This is a list of known connections to NASA Internet services. Please send your updates to the JSC WebMaster at http://www.jsc.nasa.gov or fill out a forms submission page.

NASA World Wide Web Servers

- Ames Research Center
  - AILS - Ames Imaging Library System
  - Biocomputation Center
  - CCF - Central Computing Facility
  - NAIC - Network Applications and Information Center
  - NAS Applied Research Branch (NAR)
    - Web Weavers Page
  - NAS - Numerical Aerodynamic Simulation
  - NSI - NASA Science Internet
  - New Technology Information

- Dryden Flight Research Center
- Goddard Space Flight Center
  - The CASSSO Science Support Center
National Aeronautics and Space Administration

Other Space Agencies

- Europe -- European Space Agency (ESA) (European Space Information System)
- France -- Centre d'Études et de Recherches de Toulouse (CERT) (Installation of ONERA)
- Germany -- Deutsche Forschungsanstalt für Luft- und Raumfahrt (DLR)
- Netherlands -- National Aerospace Laboratory (NRL)
- Japan -- National Space Development Agency (NASDA) [telnet]
- United Nations -- United Nations Office for Outer Space Affairs

See also: International Space Station Alpha

A service of the NSSDC. Send comments/suggestions/omissions to the curator(s).

Author: James E. Gass (gass@ndadsa.gsfc.nasa.gov)
Curator: James Gass
Last revised: 28 June 1994 (J.Gass)
The European Space Information System

Located at ESRIN, Frascati, Italy in the Information Systems Division of the European Space Agency, the ESIS project is a service to the Space Science community to provide access to scientific data, including catalogues, images, spectra and time series from a wide range of ESA/non-ESA space missions. A bibliographic service provides abstracts from a wide range of scientific journals.

What’s new on ESIS

ESIS for Astronomers

ESIS Services on the World Wide Web

- DesCat
  Access to ESIS catalogue documentation.
Full text papers from ESIS staff

McDonnell-Douglas F-15E Eagle

Powerplant:
Two Pratt and Whitney F-100-PW-220 turbofans, 14, dry, 23,450 lb. st. with afterburner

Performance:
Maximum speed: Mach 2.54 (1675 mph) at 40,000 ft.
Maximum speed: Mach 2.3 (1520 mph) at 40,000 ft.
Maximum speed: 915 mph at 1000 feet.
Service ceiling: 60,000 feet.
Rate of Climb: 50,000 feet/min.
Take Off Run: 900 feet.
Ferry range: 3570 miles.

Weights:
Basic operational empty weight: 31,700 lb.
Empty Weight: 27,000 lb. (F-15C)
Normal takeoff weight: 44,630 lb with full fuel
Maximum take-off weight: 81,000 lb.

Armament:
One 20mm six-barrel rotary cannon and up to four AIM-7 and AIM-9 AAMS, or up to eight AIM-120 AAMS
In attack mode, can carry up to 23,500 lbs. of or wing and fuselage stations.

Electronics:
APG-70 radar
Programmable weapons stores management system
Index of On-line FAR’s

by Kevin Kahn

This directory contains copies of the FAR as provided by Rick Cremer on CompuServe. I only copy the files down from CompuServe and put them here as time permits. I don’t have any way of getting files that aren’t there yet so please don’t swamp me with requests for such. Also, I don’t control the format of the contents -- in most cases I haven’t even looked at these. So if a file is corrupted let me know and I’ll recopy it but if you don’t like the way the FAA lays things out in it talk to them :-) . I’m sure that some inspired person will figure out how to generate an indexing system for them but that’s also not me. What you see is what you get.

WARNING! These are big files.

The files are as follows:

- FAR PART 1 - DEFINITIONS AND ABBREVIATIONS
- FAR PART 11 - GENERAL RULE-MAKING PROCEDURES
- FAR PART 13 - INVESTIGATION AND ENFORCEMENT PROC.
- FAR PART 23 - AW STNDRDS FOR NORM/UTIL/ACRO AIRPL
- FAR PART 25 - AW STNDRDS: TRANSPORT CATEGORY AIRP
- FAR PART 43 - MAINTENANCE, REBUILDING, ALTERATION
- FAR PART 45 - IDENTIFICATION/REGISTRATION MARKS
- FAR PART 47 - AIRCRAFT REGISTRATION
Aircraft Aerodynamics and Design Group

Department of Aeronautics and Astronautics
Stanford University, Stanford, California

Last Update 7/15/94

On-Line Technical Reports

- Multidisciplinary Optimization for Aircraft Preliminary Design
- Development of the SWIFT
- Oblique Wing Bibliography
- A Quasi-Procedural Method for Aircraft Design
A Quasi-Procedural, Knowledge-Based System for Aircraft Design

Ilan Kroo* and Masami Takai
Stanford University
Stanford, California

Abstract

This paper deals with the development of a program for aircraft design, combining a rule-based advice and warning system with an extensible set of analysis routines in an unconventional architecture. The system consists of several procedural modules for calculation of aircraft aerodynamics, structures, propulsion, and operating costs, which, when executed in the appropriate order, permit computation of desired results. Unlike conventional programs, the subroutines and order of execution are selected during the computation, based on the required results and on the currently available results. Unlike nonprocedural programming languages, however, the modules are procedural, allowing the programmer the flexibility to include either short definitions or complex local procedures. This structure is encapsulated in an executive routine with a highly-interactive, event-driven, graphical interface and expert system. The rule-based system is used to assist the user in selecting intelligent design solutions and appropriate analysis procedures. This paper discusses the structure of the program, some of the difficulties encountered in its development, and its potential applications.
Structures and Materials Laboratory

Composites Department

Head of the Composites department is Ir. Adriaan Beukers.

Main Research Topics are:

- Composite Fuselages
- Rubberforming of CFRP's
- Diaphragm Forming
- Computer Simulation of Manufacturing Processes
- Reinforced openings in composite structures

(c) 1994, IMS.
Cranfield College of Aeronautics

College of Aeronautics

The College of Aeronautics was established as a Graduate School at Cranfield in 1946 and was the forerunner of Cranfield University. Graduates of the College now occupy the most senior positions in the aerospace industry throughout the world. They are currently involved in many of the latest aerospace developments involving government, research and development organisations and air transport operations. Links with a number of higher education establishments have been formed worldwide.

The College operates a fleet of aircraft for in-flight research and laboratory work. This includes two B.Ae Jetstream aircraft, one of which is used for the mechanics of flight (aerodynamics, stability and control) and the other for avionic systems.

The main fields of study include:

Aerospace Technology:
- Aerospace Vehicle Design
- Aerodynamics
- Computational Fluid Dynamics
- Flight Dynamics

Aerospace Science:
The Mars Transfer Vehicle (MTV)

The Mars Transfer Vehicle (MTV) is a reusable bus designed to convey a crew of six astronauts to the Mars surface and return them to Earth. It was designed by Mark Ford using SDRC's IDEAS CAD/CAM software as part of PhD research concerned with the long term storage and usage of cryogenic propellants.

There are two main design drivers for the vehicle. Firstly, it may only use existing technology and secondly that it must use cryogenic propellants LO2/LH2 throughout all the phases of its mission.

The mission is a three year round trip employing minimum energy transfers for both legs. The astronauts will spend approximately one year on the Martian surface.

The MTV consists of a Mars lander with aeroshell for atmospheric braking (in blue), three "freedom" size habitation/laboratory modules for the crew. Four Liquid Hydrogen tanks and two liquid oxygen tanks. At the rear is the SP-100 reactor for onboard power. The main engines are SSME derivatives.